

**AREA 317 GROUND WATER MONITORING
1996 ANNUAL SUMMARY REPORT**

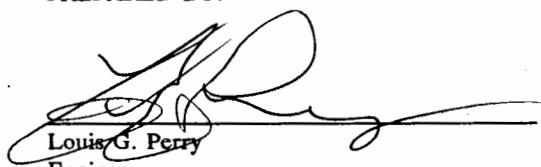
**WHITTAKER CORPORATION, BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD
SANTA CLARITA, CALIFORNIA 91350
AME PROJECT NO. 21001.75**

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AREA 317 RCRA GROUND WATER MONITORING 1996 ANNUAL SUMMARY REPORT

**WHITTAKER CORPORATION, BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD
SANTA CLARITA, CALIFORNIA 91350**

1.0 INTRODUCTION

The Whittaker Corporation (Whittaker), Bermite facility (site) is located at 22116 West Soledad Canyon Road in Santa Clarita, California (Figure 1). Whittaker had interim status permits for 14 Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Units (HWMUs) when operations were terminated in April 1987. A document entitled "Whittaker Corporation, Bermite Division, Santa Clarita, California, CAD064573108, Facility Closure Plan Modifications" (Closure Plan), was prepared by Whittaker and approved by the California Environmental Protection Agency, Department of Toxic Substances Control (Cal-EPA) and U.S. Environmental Protection Agency (EPA) on December 28, 1987. The Closure Plan outlined procedures for obtaining approval by Cal-EPA and EPA of clean closure certification for the different HWMUs, including the 317 Surface Impoundment (Area 317).

The Closure Plan required the implementation of a ground water monitoring system at Area 317 capable of detecting and assessing the impact of the HWMU on the uppermost aquifer underlying Area 317. Implementation of a ground water monitoring system is described in the document entitled "Water Quality Monitoring and Response Plan for the Interim Status Area 317 Surface Impoundment," dated October 9, 1992 (Area 317 Monitoring Plan). This is a revised response plan approved by Cal-EPA which meets the requirements of the revisions to Title 22 and expands the constituents sampled and reported. The revised Area 317 Monitoring Plan was utilized for the nineteenth and subsequent sampling events.

A total of five ground water monitoring wells (MW-1, MW-3, MW-5, MW-6, and MW-10) are installed around Area 317 (Figure 2). During the 1996 calendar year, ground water samples from monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10 were collected in March, June, September, and December. Section 2 presents the annual summary for data obtained in the 1996 sampling events.

2.0 ANNUAL SUMMARY OF RESULTS, 1996 MONITORING

2.1 Ground Water Level Measurements and Estimated Flow Direction

For each sampling event in 1996, the estimated ground water flow direction inferred from ground water level measurements was toward the north-northeast. The historically estimated ground water flow direction has generally been toward the north-northeast, although some

variation toward the northwest has been inferred. A compilation of water level measurements for the Area 317 wells is provided in Table 1. Figure 2 illustrates the inferred ground water flow direction for the most recent (December 1996) monitoring event.

2.2 Ground Water Monitoring Parameters

The 1996 analytical results presented in Table 2 indicate concentrations for monitoring parameters to be generally consistent from quarter to quarter. Analytical results for 1996 are also generally consistent with historical data. With regard to the results for trichloroethene (TCE), the primary constituent of concern in Area 317, reports for all samples from all wells were non-detect for TCE at a detection limit of 0.5 $\mu\text{g/l}$, with the exception of the original sample collected from well MW-5 on March 20, 1996. The laboratory analytical result for the March 20, 1996, sample indicated 0.6 $\mu\text{g/l}$ TCE. A sample duplicate also collected from well MW-5 on March 20, 1996, did not indicate that TCE was present at or above the detection limit. As required by Section 8.0 (Response Program) of the Area 317 Monitoring Plan, a repeat sample was collected from MW-5 for analysis on April 8, 1996, following well purging and stabilization. The repeat sampling event did not confirm the presence of TCE. The March 20, 1996, TCE sample result for MW-5 is therefore believed to be a laboratory error and reported as non-detect in the summary data.

2.3 Background Water Quality Parameters

Background water quality parameters were not tested during 1996. The Area 317 Monitoring Plan specifies testing for background water quality parameters when tolerance limits for any monitoring parameter are exceeded for three consecutive monitoring events. Background water quality parameters were last tested during the twenty-third monitoring event in 1994, when all monitoring wells were tested for the background parameters because of results for sodium in samples from monitoring well MW-10 exceeding tolerance limits. The results of the background water quality testing in the twenty-third monitoring event did not indicate a degradation of ground water quality with respect to the background parameters. Background water quality parameter data for Area 317 monitoring are compiled in Table 3.

2.4 Statistical Analysis

For the monitoring parameters specific conductance, chloride, sulfate, iron, manganese, TCE, total organic carbon, and total organic halogens, statistical analysis of 1996 analytical results from all downgradient monitoring wells indicates these parameters were within tolerance limits established from data for the background monitoring wells, leading to the conclusion that none of these parameters adversely impacted ground water quality. Analytical results for sodium in samples from downgradient monitoring wells MW-5 and MW-6 were also within tolerance limits, but the reported sodium concentration in downgradient monitoring well MW-10 exceeded the tolerance limit in each 1996 sampling event. Additionally, the laboratory pH measurement

of 8.1 for the sample collected from well MW-10 during the most recent (December 1996) monitoring event exceeded the calculated tolerance limit of 7.98. However, based on the background testing discussed in Section 2.3, along with the results for other parameters in monitoring well MW-10, and the results for all parameters in monitoring wells MW-5 and MW-6 being within tolerance limits, AME concludes that the sodium results for monitoring well MW-10 are an anomaly and not an indication of ground water degradation in Area 317. With regard to the pH tolerance limit exceedance for well MW-10, AME proposes no related action unless two more consecutive exceedances are reported. Summary 1996 analytical results and tolerance interval data for Area 317 wells MW-5, MW-6, and MW-10 are provided in Table 4. Summary data for Area 317 background wells MW-1 and MW-3 are compiled in Tables 5 and 6. Tolerance limit calculations based on Area 317 background well parameter data compiled through the most recent (December 1996) monitoring event are provided in Table 7.

3.0 REMARKS

The conclusions contained in this report represent our professional opinions. These opinions are based on currently available information and were developed in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

TABLE 1

**POTENIOMETRIC SURFACE ELEVATIONS
RCRA GROUND WATER MONITORING WELLS
WHITTAKER CORPORATION, BERMITE FACILITY**

| Well No. | MW-1 | MW-3 | MW-4 | MW-5 | MW-6 | MW-10 |
|---|--|----------------|----------------|----------|----------|----------|
| Top of Casing Elevation ^a | 1,561.32 | 1,538.51 | 1,538.43 | 1,493.37 | 1,521.09 | 1,537.49 |
| Date | Potentiometric Surface Elevations ^b | | | | | |
| 12/23/87 | 1,107.81 | — ^b | | | | |
| 01/27/88 | 1,108.03 | 1,109.51 | | | | |
| 02/03/88 | 1,108.32 | 1,109.88 | | | | |
| 02/04/88 | 1,108.36 | 1,109.14 | | | | |
| 02/05/88 | 1,108.36 | 1,109.17 | | | | |
| 02/09/88 | 1,108.24 | 1,109.13 | | | | |
| 02/10/88 | 1,108.28 | 1,109.27 | | | | |
| 02/12/88 | 1,108.28 | 1,109.27 | | | | |
| 02/19/88 | 1,108.11 | 1,108.86 | | | | |
| 03/28/88 | 1,107.69 | 1,108.23 | | | | |
| 04/05/88 | 1,107.76 | 1,108.23 | | | | |
| 04/12/88 | 1,107.66 | 1,108.23 | | | | |
| 04/19/88 | 1,107.56 | 1,108.23 | | | | |
| 04/26/88 | 1,107.61 | 1,108.23 | | | | |
| 05/02/88 | 1,107.86 | 1,108.23 | | | | |
| 07/27/88 | 1,103.58 | 1,104.19 | 1,102.61 | | | |
| 10/03/88 | 1,101.75 | 1,102.11 | 1,100.77 | | | |
| 01/23/89 | 1,099.82 | 1,100.25 | 1,098.92 | | | |
| 04/17/89 | 1,097.37 | 1,097.62 | 1,096.05 | | | |
| 07/27/89 | 1,094.67 | 1,094.85 | 1,093.53 | 1,093.02 | 1,093.15 | |
| 08/10/89 | 1,093.93 | 1,094.09 | 1,092.89 | 1,092.32 | 1,092.49 | |
| 08/18/89 | 1,093.62 | 1,093.76 | 1,092.64 | 1,092.03 | 1,092.19 | |
| 10/30/89 | 1,092.07 | 1,092.16 | 1,091.08 | 1,090.62 | 1,090.64 | |
| 01/24/90 | 1,090.56 | 1,090.54 | 1,089.68 | 1,089.17 | 1,089.50 | |
| 04/16/90 | 1,088.66 | 1,088.78 | 1,087.83 | 1,087.23 | 1,087.32 | |
| 07/16/90 | 1,083.56 | 1,083.53 | 1,082.29 | 1,081.41 | 1,081.85 | |
| 10/17/90 | 1,079.91 | 1,079.78 | 1,078.86 | 1,078.25 | 1,078.56 | |
| 01/28/91 | 1,076.52 | 1,076.54 | 1,075.46 | 1,074.64 | 1,074.91 | |
| 04/22/91 | 1,071.22 | 1,071.29 | 1,069.75 | 1,068.90 | 1,069.25 | |
| 07/17/91 | 1,063.63 | 1,063.79 | 1,061.66 | 1,060.53 | 1,061.14 | |
| 10/08/91 | 1,055.22 | 1,055.41 | 1,053.28 | 1,052.12 | 1,052.69 | |
| 01/29/92 | 1,051.88 | 1,052.29 | 1,050.63 | 1,049.76 | 1,050.06 | 1,050.57 |
| 04/20/92 | 1,050.47 | 1,050.88 | 1,049.33 | 1,048.78 | 1,048.92 | 1,049.37 |
| 07/28/92 | 1,046.84 | 1,047.40 | — ^c | 1,045.14 | 1,045.20 | 1,045.77 |
| 10/19/92 | 1,043.87 | 1,044.58 | — ^c | 1,042.05 | 1,042.13 | 1,042.77 |
| 01/25/93 | 1,044.79 | 1,045.61 | — ^c | 1,044.22 | 1,043.64 | 1,044.29 |
| 06/07/93 | 1,049.24 | 1,050.36 | — ^c | 1,049.19 | 1,048.70 | 1,049.21 |
| 09/20/93 | 1,052.40 | 1,054.11 | — ^c | 1,052.47 | 1,051.79 | 1,052.53 |
| 12/06/93 | 1,054.26 | 1,056.27 | — ^c | 1,054.29 | 1,053.58 | 1,054.53 |
| 03/07/94 | 1,057.58 | 1,059.63 | — ^c | 1,057.69 | 1,056.92 | 1,057.77 |
| 06/21/94 | 1,056.22 | 1,058.38 | — ^c | 1,055.41 | 1,054.93 | 1,055.86 |
| 09/13/94 | 1,053.94 | 1,056.25 | — ^c | 1,052.79 | 1,052.44 | 1,053.43 |
| 12/12/94 | 1,054.62 | 1,056.79 | — ^c | 1,054.00 | 1,053.55 | 1,054.50 |
| 03/27/95 | 1,059.54 | 1,061.45 | — ^c | 1,059.80 | 1,059.28 | 1,059.89 |
| 06/26/95 | 1,060.73 | 1,062.97 | — ^c | 1,060.35 | 1,059.87 | 1,060.82 |
| 09/08/95 | 1,061.46 | 1,063.59 | — ^c | 1,061.06 | 1,060.66 | 1,061.58 |
| 12/04/95 | 1,064.21 | 1,066.41 | — ^c | 1,064.15 | 1,063.65 | 1,064.51 |
| 03/18/96 | 1,068.60 | 1,070.83 | — ^c | 1,068.75 | 1,067.99 | 1,068.99 |
| 06/24/96 | 1,066.82 | 1,068.94 | — ^c | 1,065.99 | 1,065.54 | 1,066.61 |
| 09/17/96 | 1,067.92 | 1,070.21 | — ^c | 1,067.71 | 1,067.28 | 1,068.24 |
| 12/03/96 | 1,066.73 | 1,068.66 | — ^c | 1,065.75 | 1,065.37 | 1,066.43 |

^aNGVD = National Geodetic Vertical Datum.^bMeasurement not recorded.^cMonitoring well abandoned 05/28/92.

TABLE 2
GROUND WATER MONITORING PARAMETER ANALYTICAL RESULTS
(SUMMARY DATA FOR 1996)

| Monitoring Well | Date | Specific Conductance ($\mu\text{mhos}/\text{cm}^2$) | pH | TOC ^b (mg/l) | TOX ^c ($\mu\text{g}/\text{l}$) | Chloride (mg/l) | Sulfate (mg/l) | TCE ^a ($\mu\text{g}/\text{l}$) | Iron ($\mu\text{g}/\text{l}$) | Manganese ($\mu\text{g}/\text{l}$) | Sodium (mg/l) |
|-----------------|----------|---|-----|-------------------------|---|-----------------|----------------|---|---------------------------------|--------------------------------------|---------------|
| MW-1 | 03/20/96 | 770 | 7.4 | <0.5 | <5 | 180 | 13 | <0.5 | <50 | 2.1 | 51 |
| | 06/26/96 | 760 | 7.7 | <0.5 | <5 | 150 | 13 | <0.5 | <50 | 2.1 | 53 |
| | 09/19/96 | 750 | 7.6 | <0.5 | 7 | 160 | 12 | <0.5 | 80 | 1.8 | 52 |
| | 12/05/96 | 750 | 7.5 | <0.5 | <5 | 160 | 10 | <0.5 | <50 | 2.6 | 55 |
| MW-3 | 03/20/96 | 610 | 7.6 | <0.5 | <5 | 35 | 91 | <0.5 | <50 | <0.5 | 57 |
| | 06/26/96 | 600 | 7.9 | <0.5 | <5 | 31 | 78 | <0.5 | <50 | 3.3 | 61 |
| | 09/19/96 | 610 | 8.0 | <0.5 | <5 | 30 | 71 | <0.5 | <50 | <0.5 | 56 |
| | 12/05/96 | 600 | 7.6 | <0.5 | <5 | 26 | 62 | <0.5 | <50 | <0.5 | 56 |
| MW-5 | 03/20/96 | 540 | 7.7 | <0.5 | <5 | 57 | 36 | <0.5 | <50 | 1.6 | 55 |
| | 06/26/96 | 520 | 7.6 | <0.5 | <5 | 50 | 34 | <0.5 | <50 | 1.5 | 55 |
| | 09/19/96 | 540 | 7.6 | <0.5 | 53 | 45 | 29 | <0.5 | 70 | 1.9 | 55 |
| | 12/05/96 | 520 | 7.7 | <0.5 | <5 | 52 | 30 | <0.5 | <50 | 1.6 | 60 |
| MW-6 | 03/20/96 | 560 | 7.7 | <0.5 | <5 | 76 | 29 | <0.5 | <50 | 1.4 | 53 |
| | 06/26/96 | 570 | 7.5 | <0.5 | <5 | 70 | 34 | <0.5 | <50 | 1.3 | 56 |
| | 10/01/96 | 570 | 7.6 | <0.5 | 8 | 76 | 28 | <0.5 | 100 | 1.2 | 48 |
| | 12/05/96 | 570 | 7.7 | <0.5 | <5 | 71 | 33 | <0.5 | <50 | 1.0 | 57 |
| MW-10 | 03/20/96 | 610 | 7.8 | <0.5 | <5 | 83 | 45 | <0.5 | <50 | 1.7 | 82 |
| | 06/28/96 | 600 | 7.7 | <0.5 | <5 | 70 | 43 | <0.5 | <50 | 1.8 | 80 |
| | 09/25/96 | 610 | 7.6 | <0.5 | <5 | 66 | 37 | <0.5 | 80 | 1.8 | 77 |
| | 12/05/96 | 610 | 8.1 | <0.5 | <5 | 74 | 41 | <0.5 | <50 | 1.2 | 92 |

^aTCE = Trichloroethene.

^bTOC = Total organic carbon.

^cTOX = Total organic halogens.

TABLE 3
BACKGROUND WATER QUALITY PARAMETERS

| Well No. | Date Sampled | Gross Alpha (pCi/l) | Gross Beta (pCi/l) | Lead (mg/l) | Fluoride (mg/l) | Nitrate (mg/l) | Turbidity (NTUs) |
|--------------------|--------------|---------------------|--------------------|------------------------------|-----------------|----------------|------------------|
| Detection Limits | | | | -0.01 ^a 0.0002 | 0.1 | 0.4 | 0.2 |
| MW-1 | 10/04/88 | 0.4 ± 2 | 0.7 ± 2 | <0.01 | -- ^b | -- | -- |
| | 01/27/93 | 0 ± 1 | 4 ± 2 | <0.01 | 0.2 | -- | -- |
| | 06/09/93 | 0.4 ± 1 | 0.7 ± 2 | <0.01 | 0.2 | 3.9 | 0.4 |
| | 07/14/93 | 2 ± 2 | 0 ± 2 | <0.01 | 0.4 | 4.8 | 0.9 |
| | 08/11/93 | 1 ± 1 | 4 ± 4 | <0.01 | 0.3 | 4.8 | 0.9 |
| | 09/22/93 | -- | -- | -- | -- | -- | 0.5 |
| | 03/10/94 | -- | -- | -- | -- | ND | -- |
| | 06/22/94 | 2 ± 2 | 4 ± 2 | <0.0002 | 0.2 | 3.6 | 1.0 |
| MW-3 | 10/04/88 | 0.7 ± 1 | 2 ± 3 | <0.01 | -- | -- | -- |
| | 01/27/93 | 0.8 ± 1 | 2 ± 2 | <0.01 | 0.3 | -- | -- |
| | 06/09/93 | 2 ± 1 | 1 ± 2 | <0.01 | 0.2 | 1.6 | <0.2 |
| | 07/14/93 | 2 ± 2 | 1 ± 2 | <0.01 | 0.3 | 2.1 | <0.2 |
| | 08/11/93 | 4 ± 2 | 3 ± 4 | <0.01 | 0.2 | 2.2 | 0.3 |
| | 09/22/93 | -- | -- | -- | -- | -- | <0.2 |
| | 03/10/94 | -- | -- | -- | -- | 1.4 | -- |
| | 06/22/94 | 1.0 ± 1 | 2 ± 2 | 4.9 | 0.2 | 3.6 | 0.3 |
| MW-5 ^c | 06/22/94 | 1.0 ± 1 | 3 ± 2 | <0.0002 | 0.2 | 3.6 | 0.9 |
| MW-6 ^c | 06/22/94 | 0.1 ± 1 | 2 ± 2 | <0.0002 | 0.2 | 3.8 | 0.8 |
| MW-10 ^c | 06/22/94 | 0.4 ± 1 | 4 ± 2 | <0.0002 | 0.2 | 3.7 | 0.8 |

^aDetection limit lowered from 0.01 to 0.0002 mg/l on 6/22/94.

^bSample was not taken.

^cSamples collected from monitoring wells MW-5, MW-6, and MW-7 during the twenty-third sampling event were analyzed for the background water quality parameters because of a repeated tolerance interval exceedence for sodium during previous sampling events.

TABLE 4

**SUMMARY 1996 ANALYTICAL RESULTS AND TOLERANCE INTERVAL DATA FOR
AREA 317 WELLS MW-5, MW-6, AND MW-10**

| Parameter | Sampling Event | Units | Tolerance Limit | Well No. | | |
|----------------------|----------------|------------------------------|------------------|----------|------|-------|
| | | | | MW-5 | MW-6 | MW-10 |
| Specific Conductance | 30 | $\mu\text{mhos}/\text{cm}^2$ | 785 | 540 | 560 | 610 |
| | 31 | | 787 | 520 | 570 | 600 |
| | 32 | | 788 | 540 | 570 | 610 |
| | 33 | | 789 | 520 | 570 | 610 |
| pH | 30 | | 7.05/7.97 | 7.6 | 7.6 | 7.8 |
| | 31 | | 7.05/7.98 | 7.7 | 7.7 | 7.7 |
| | 32 | | 7.03/8.01 | 7.7 | 7.7 | 7.6 |
| | 33 | | 7.06/7.98 | 7.7 | 7.7 | 8.1 |
| TOC | 30 | mg/l | 3.11 | <0.5 | <0.5 | <0.5 |
| | 31 | | 3.06 | <0.5 | <0.5 | <0.5 |
| | 32 | | 3.00 | <0.5 | <0.5 | <0.5 |
| | 33 | | 2.95 | <0.5 | <0.5 | <0.5 |
| TOX | 30 | $\mu\text{g}/\text{l}$ | 56 | <5 | <5 | <5 |
| | 31 | | 55 | <5 | <5 | <5 |
| | 32 | | 54 | 53 | 8 | <5 |
| | 33 | | 53 | <5 | <5 | <5 |
| Chloride | 30 | mg/l | 193 | 57 | 76 | 83 |
| | 31 | | 193 | 50 | 70 | 70 |
| | 32 | | 194 | 45 | 76 | 66 |
| | 33 | | 195 | 52 | 71 | 74 |
| Sulfate | 30 | mg/l | 104 | 36 | 29 | 45 |
| | 31 | | 104 | 34 | 34 | 43 |
| | 32 | | 104 | 29 | 28 | 37 |
| | 33 | | 103 | 30 | 33 | 41 |
| TCE | 30 | $\mu\text{g}/\text{l}$ | 0.5 ^a | <0.5 | <0.5 | <0.5 |
| | 31 | | 0.5 | <0.5 | <0.5 | <0.5 |
| | 32 | | 0.5 | <0.5 | <0.5 | <0.5 |
| | 33 | | 0.5 | <0.5 | <0.5 | <0.5 |
| Iron | 30 | $\mu\text{g}/\text{l}$ | 205 | <50 | <50 | <50 |
| | 31 | | 198 | <50 | <50 | <50 |
| | 32 | | 193 | 70 | 100 | 80 |
| | 33 | | 187 | <50 | <50 | <50 |

TABLE 4 (continued)

**SUMMARY 1996 ANALYTICAL RESULTS AND TOLERANCE INTERVAL DATA FOR
AREA 317 WELLS MW-5, MW-6, AND MW-10**

| Parameter | Sampling Event | Units | Tolerance Limit | Well No. | | |
|-----------|----------------|-----------------|-----------------|----------|------|-------|
| | | | | MW-5 | MW-6 | MW-10 |
| Manganese | 30 | $\mu\text{g/l}$ | 23.0 | 1.6 | 1.4 | 1.7 |
| | 31 | | 23.0 | 1.5 | 1.3 | 1.8 |
| | 32 | | 22.2 | 1.9 | 1.2 | 1.8 |
| | 33 | | 21.6 | 1.6 | 1.0 | 1.2 |
| Sodium | 30 | mg/l | 58.9 | 55 | 53 | 82 |
| | 31 | | 59.9 | 55 | 56 | 80 |
| | 32 | | 60 | 55 | 48 | 77 |
| | 33 | | 60 | 60 | 57 | 92 |

Note: All tolerance limits are upper limits except pH which has both upper and lower limits.

*Tolerance limit set at detection limit.

TABLE 5
CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-1

| Date | Quarter | pH* | Conductance ^a (μmhos/cm ²) | TOC ^a (mg/l) | TOX ^a (μg/l) | SO ₄ ²⁻ (mg/l) | Cl ⁻ (mg/l) | Fe (μg/l) | Mn (μg/l) | Na (mg/l) | TCE (μg/l) |
|-----------------------|---------|------|--|----------------------------|----------------------------|---|---------------------------|--------------|--------------|--------------|---------------|
| 10/04/88 ^b | 1 | 7.5 | 598 | <3 | <100 | 11 | | | | | <5 |
| 01/25/89 | 2 | 7.48 | 572 | 2.4 ^c | <100 | 22 | | | | | |
| 04/17/89 | 3 | 7.2 | | <3 | <100 | 11 | | | | | |
| 07/27/89 | 4 | 7.48 | 500 | 2.4 ^c | <100 | 13 | | | | | |
| 10/31/89 | 5 | 7.6 | 524 | <3 | <100 | 10 | 83 | | | | |
| 01/25/90 | 6 | 7.4 | 570 | <3 | <100 | 16 | 85 | | | | |
| 04/17/90 | 7 | 7.55 | 504 | <4 | <20 | 11 | 88 | | | | |
| 07/17/90 | 8 | 8.28 | 530 | <4 | <20 | 10 | 82 | | | | |
| 10/18/90 | 9 | 7.4 | 544 | <1 | 75 ^c | 23 | 98 | | | | |
| 01/29/91 | 10 | 7.5 | 573 | 1.4 | <5 | 8 | 96 | | | | |
| 04/23/91 | 11 | 7.68 | 559 | 1.8 | <5 | 10 | 100 | | | | |
| 07/19/91 | 12 | 7.33 | 575 | 1.2 | <5 | 11 | 97 | | | | |
| 10/08/91 ^d | -- | -- | -- | -- | -- | -- | -- | | | | |
| 03/13/92 | 14 | 7.5 | 639 | 0.4 ^c | <5 | 13 | 131 | | | | |
| 04/21/92 | 15 | 7.5 | 643 | <0.5 | <5 | 9 | 130 | | | | |
| 07/29/92 | 16 | 7.55 | 660 | <0.5 | 6.9 | 11 | 133 | | | | |
| 10/20/92 | 17 | 7.5 | 676 | <0.5 | <5 | 10 | 138 | | | | |
| 01/27/93 | 18 | 7.68 | 707 | <0.5 | <5 | 6 | 137 | | | | |
| 06/09/93 | 19 | 7.5 | 715 | <0.5 | <5 | 9 | 134 | 250 | <30 | 52 | |
| 07/14/93 | 20 | -- | -- | -- | -- | -- | -- | 220 | <30 | 46 | |
| 08/11/93 | 20 | -- | -- | -- | -- | -- | -- | 60 | <30 | 54 | |
| 09/22/93 | 20 | 7.5 | 720 | <0.5 | 9 | 13 | 161 | 100 | <30 | 52 | |
| 12/08/93 | 21 | 7.4 | 726 | <0.5 | <5 | 10 | 151 | 50 | <30 | 57 | |

TABLE 5 (continued)

CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-1

| Date | Quarter | pH ^a | Conductance ^b ($\mu\text{mhos}/\text{cm}^2$) | TOC ^c (mg/l) | TOX ^d ($\mu\text{g}/\text{l}$) | SO_4^{2-} (mg/l) | Cl ^e (mg/l) | Fe ($\mu\text{g}/\text{l}$) | Mn ($\mu\text{g}/\text{l}$) | Na (mg/l) | TCE ($\mu\text{g}/\text{l}$) |
|----------|---------|-----------------|--|----------------------------|--|------------------------------|---------------------------|----------------------------------|----------------------------------|--------------|-----------------------------------|
| 03/10/94 | 22 | 7.5 | 730 | <0.5 | <5 | 10 | 150 | 200 | <30 | 48 | <0.5 |
| 06/22/94 | 23 | 7.5 | 740 | <0.5 | <5 | 15 | 150 | 150 | <30 | 54 | <0.5 |
| 09/14/94 | 24 | 7.4 | 750 | <0.5 | 8 | 9 | 160 | 60 | 2.5 | 57 | <0.5 |
| 12/14/94 | 25 | 7.5 | 770 | <0.5 | <5 | 10 | 150 | 80 | 4 | 51 | <0.5 |
| 03/29/95 | 26 | 7.5 | 770 | <0.5 | <5 | 12 | 160 | 60 | 1.6 | 49 | <0.5 |
| 06/27/95 | 27 | 7.4 | 760 | <0.5 | 10 | 13 | 170 | 50 | 2.8 | 45 | <0.5 |
| 09/12/95 | 28 | 7.5 | 780 | <0.5 | 6 | 12 | 160 | 90 | 3 | 53 | <0.5 |
| 12/08/95 | 29 | 6.9 | 780 | <0.5 | <5 | 12 | 180 | <50 | 2.7 | 50 | <0.5 |
| 03/20/96 | 30 | 7.4 | 770 | <0.5 | <5 | 13 | 180 | <50 | 2.1 | 51 | <0.5 |
| 06/26/96 | 31 | 7.7 | 760 | <0.5 | <5 | 13 | 150 | <50 | 2.1 | 53 | <0.5 |
| 09/19/96 | 32 | 7.6 | 750 | <0.5 | 7 | 12 | 160 | 80 | 1.8 | 52 | <0.5 |
| 12/05/96 | 33 | 7.5 | 750 | <0.5 | <5 | 10 | 160 | <50 | 2.6 | 55 | <0.5 |

^aEach value reported before 06/09/93 is the average result from four replicate samples. Beginning 06/09/93, reported values are for a single sample as replicate sampling was stopped.

^bSamples from 01/27/88, 07/29/88, 08/15/88, and 10/04/88 reported TCE at <5 $\mu\text{g}/\text{l}$.

^cThe replicates included a portion with results below the detection limit. The average was calculated after assigning a value of one-half the detection limit for the samples below the detection limit.

^dNot sampled because water elevation dropped below elevation of sampling pump intake.

TABLE 6

**CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-3**

| Date | Quarter | pH ^a | Conductance ^a (μmhos/cm ²) | TOC ^a (mg/l) | TOX ^a (μg/l) | SO ₄ ²⁻ (mg/l) | Cl ⁻ (mg/l) | Fe (μg/l) | Mn (μg/l) | Na (mg/l) | TCE (μg/l) |
|-----------------------|---------|-----------------|--|----------------------------|----------------------------|---|---------------------------|--------------|--------------|--------------|---------------|
| 10/04/88 ^b | 1 | 7.48 | 699 | <3 | 361.25 | 73 | | | | | <5 |
| 01/25/89 | 2 | 7.73 | 664 | <3 | <100 | 74 | | | | | |
| 04/17/89 | 3 | 7.3 | | <3 | <100 | 9 | | | | | |
| 07/27/89 | 4 | 7.5 | 661 | <3 | <100 | 65 | | | | | |
| 10/31/89 | 5 | 7.53 | 617 | <3 | <100 | 68 | 35 | | | | |
| 01/25/90 | 6 | 7.18 | 641 | 7.1 ^c | <100 | 74 | 36 | | | | |
| 04/17/90 | 7 | 7.33 | 590 | <4 | <20 | 60 | 46 | | | | |
| 07/17/90 | 8 | 8.23 | 589 | <4 | <20 | 67 | 39 | | | | |
| 10/18/90 | 9 | 7.63 | 642 | 0.7 ^c | <100 | 15 | 34 | | | | |
| 01/29/91 | 10 | 7.28 | 656 | 2.2 | <5 | 80 | 54 | | | | |
| 04/23/91 | 11 | 7.55 | 629 | 2.0 | <5 | 77 | 34 | | | | |
| 07/19/91 | 12 | 7.23 | 633 | 1.3 | <5 | 85 | 45 | | | | |
| 10/09/91 | 13 | 7.65 | 642 | <0.5 | <5 | 34 | 37 | | | | |
| 03/13/92 | 14 | 7.45 | 648 | 0.6 | 3.3 ^c | 85 | 33 | | | | |
| 04/21/92 | 15 | 7.5 | 644 | <0.5 | <5 | 81 | 37 | | | | |
| 07/29/92 | 16 | 7.55 | 643 | 0.34 ^d | <5 | 74 | 33 | | | | |
| 10/20/92 | 17 | 7.55 | 641 | <0.5 | <5 | 67 | 34 | | | | |
| 01/27/93 | 18 | 7.6 | 640 | <0.5 | <5 | 69 | 30 | | | | |
| 06/09/93 | 19 | 7.6 | 627 | <0.5 | <5 | 70 | 28 | 50 | <30 | 48 | |
| 07/14/93 | 20 | — | — | — | — | — | — | <50 | <30 | 44 | |
| 08/11/93 | 20 | — | — | — | — | — | — | <50 | <30 | 50 | |
| 09/22/93 | 20 | 7.4 | 630 | <0.5 | <5 | 87 | 37 | <50 | <30 | 50 | |
| 12/08/93 | 21 | 7.4 | 627 | <0.5 | <5 | 72 | 35 | <50 | <30 | 54 | |

TABLE 6 (continued)
 CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
 IN SAMPLES FROM BACKGROUND MONITORING WELL MW-3

| Date | Quarter | pH* | Conductance* (umhos/cm ²) | TOC* (mg/l) | TOX* (μ g/l) | SO ₄ ²⁻ (mg/l) | Cl (mg/l) | Fe (μ g/l) | Mn (μ g/l) | Na (mg/l) | TCE (μ g/l) |
|----------|---------|-----|--|----------------|----------------------|---|--------------|--------------------|--------------------|--------------|---------------------|
| 03/10/94 | 22 | 7.4 | 620 | <0.5 | <5 | 74 | 31 | <50 | <30 | 47 | <0.5 |
| 06/22/94 | 23 | 7.6 | 630 | <0.5 | 8 ^d | 71 | 29 | <50 | <30 | 53 | <0.5 |
| 09/14/94 | 24 | 7.5 | 630 | <0.5 | <5 | 80 | 31 | <50 | 0.7 | 52 | <0.5 |
| 12/14/94 | 25 | 7.5 | 630 | <0.5 | <5 | 69 | 28 | <50 | <1 | 48 | <0.5 |
| 03/29/95 | 26 | 7.7 | 620 | <0.5 | 7 | 71 | 28 | <50 | 0.8 | 49 | <0.5 |
| 06/27/95 | 27 | 7.6 | 620 | <0.5 | 7 | 76 | 32 | <50 | 0.6 | 53 | <0.5 |
| 09/12/95 | 28 | 7.6 | 620 | <0.5 | <5 | 73 | 34 | <50 | <1 | 53 | <0.5 |
| 12/06/95 | 29 | 7.5 | 620 | <0.5 | <5 | 77 | 29 | <50 | <0.5 | 54 | <0.5 |
| 03/20/96 | 30 | 7.6 | 610 | <0.5 | <5 | 91 | 35 | <50 | <0.5 | 57 | <0.5 |
| 06/26/96 | 31 | 7.9 | 600 | <0.5 | <5 | 78 | 31 | <50 | 3.3 | 61 | <0.5 |
| 09/19/96 | 32 | 8.0 | 610 | <0.5 | <5 | 71 | 30 | <50 | <0.5 | 56 | <0.5 |
| 12/05/96 | 33 | 7.6 | 600 | <0.5 | <5 | 62 | 26 | <50 | <0.5 | 56 | <0.5 |

*Each value reported before 06/09/93 is the average result from four replicate samples. Beginning 06/09/93, reported values are for a single sample as replicate sampling was stopped.

^bSamples from 02/17/88, 05/27/88, 07/19/88, 08/15/88, and 10/04/88 reported TCE at <5 μ g/l.

^cThe replicates included a portion with results below the detection limit. The average was calculated after assigning a value of one-half the detection limit for the samples below the detection limit.

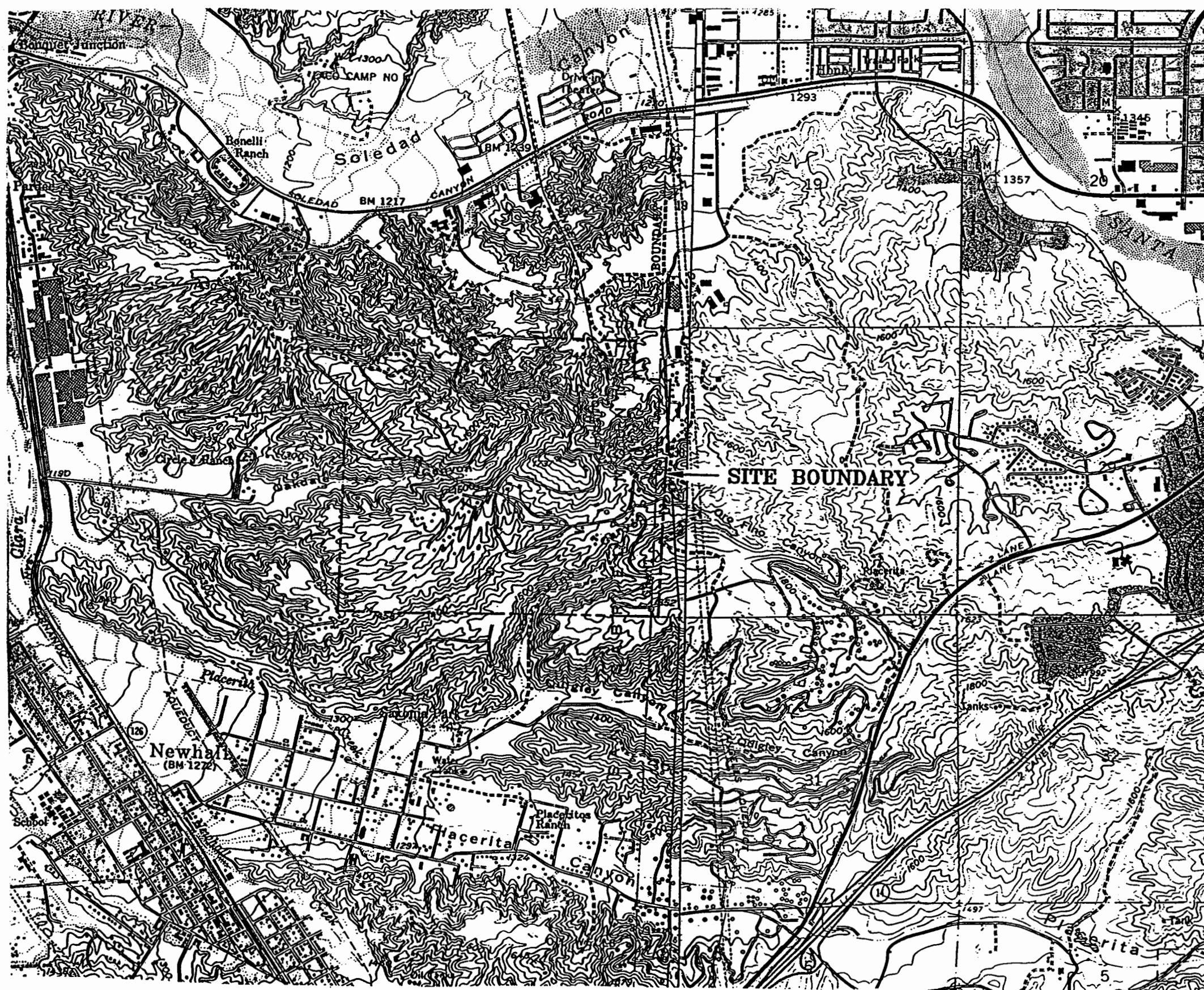
^dDuplicate sample analytical result also 8 μ g/l.

TABLE 7
TOLERANCE LIMIT CALCULATIONS
(DECEMBER 1996)

| | pH | Conductance | TOC | TOX | Chloride | Sulfate | Iron | Manganese | Sodium |
|------------------------------------|-------|-------------|-------|--------|----------|---------|-------|-----------|--------|
| Σx | 489.1 | 40,818 | 55.34 | 879.70 | 4,765 | 2,657 | 2,000 | 242.6 | 1,765 |
| n (number of samples) | 65 | 63 | 65 | 64 | 57 | 65 | 34 | 34 | 34 |
| \bar{x} (mean) | 7.52 | 647.9 | 0.85 | 13.75 | 83.60 | 40.88 | 58.82 | 7.14 | 51.9 |
| s (sample standard deviation) | 0.20 | 70.44 | 1.05 | 19.65 | 54.82 | 31.29 | 58.87 | 6.64 | 3.74 |
| k (from tables) | 2.315 | 2.007 | 2.000 | 2.003 | 2.028 | 2.000 | 2.177 | 2.177 | 2.177 |
| Upper Tolerance Limit ^a | 7.98 | 789 | 2.95 | 53 | 195 | 103 | 187 | 21.6 | 60 |
| Lower Tolerance Limit ^b | 7.06 | | | | | | | | |

^aUpper Tolerance Limit = $\bar{x} + ks$.

^bLower Tolerance Limit = $\bar{x} - ks$.



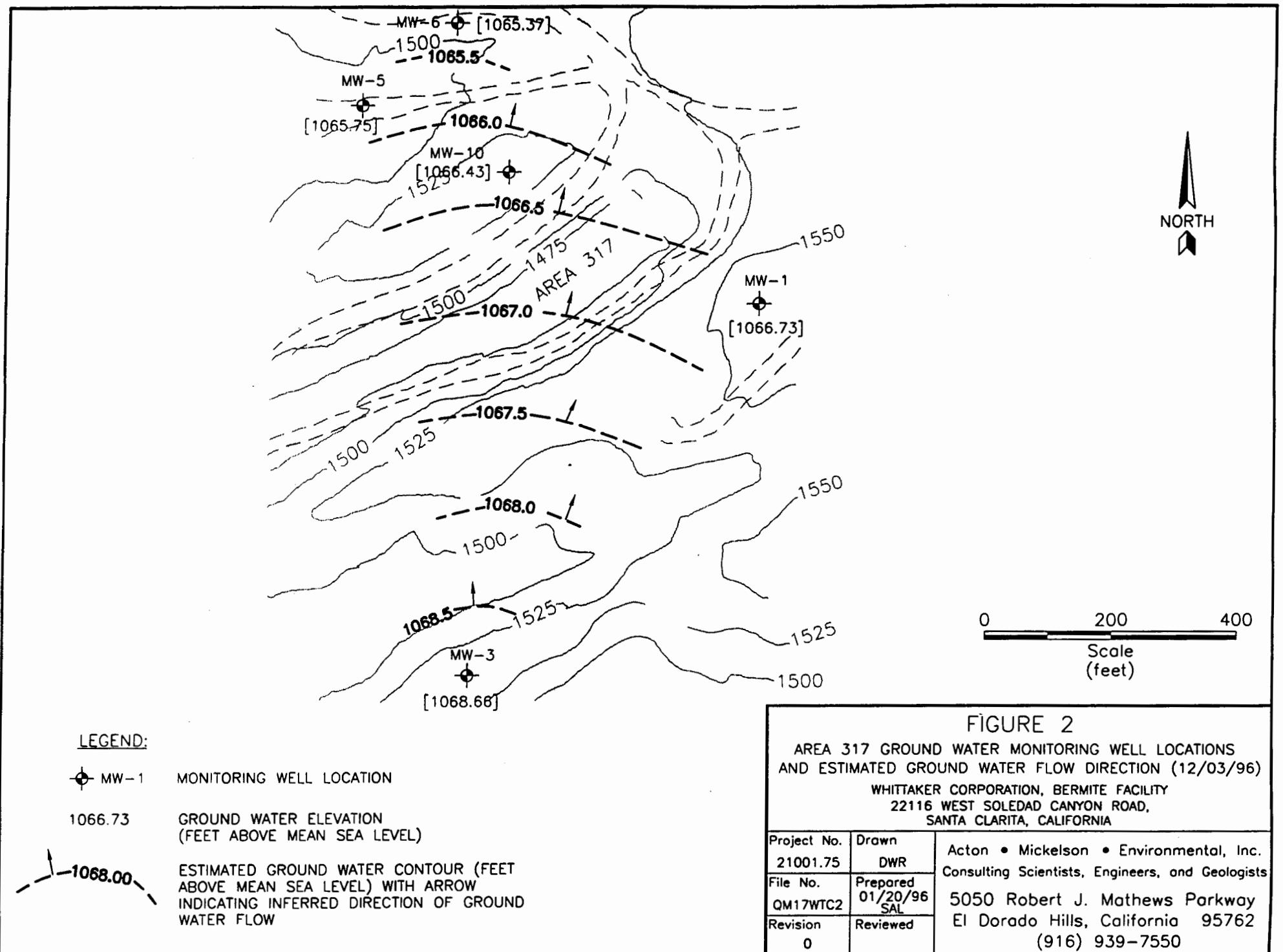


FIGURE 5

